

C E Composites-04.US

Serial number 10/672,060

Schedule A  
to the Response the Office Action of June 7, 2006

Please amend the claims of the specification to read as follows:

**Claims 1-13 (Cancelled)**

14. (Withdrawn) A tubular baseball bat with a longitudinal axis comprising a cylindrical handle portion for gripping, a cylindrical tubular barrel portion of given length for striking, the barrel portion having a barrel wall with a sweet spot area within its length, and a tapered bridging portion connecting the handle portion and the barrel portion, wherein the barrel portion has:

- a) a distal end remote from the handle;
- b) a proximal end where the tapered portion connects to the handle portion;
- c) a mid-section within the barrel portion, the mid-section being of shorter length than the length of the barrel portion and including the sweet spot area;
- d) two lateral regions extending on either sides of the mid-section towards the distal and proximal ends respectively, and
- e) a radial stiffness for the barrel wall at each location along the length of the barrel portion,

the radial stiffness of the barrel wall being greater in the mid-section of the barrel portion than in the two lateral regions of the barrel portion,

to provide a flattened batting performance over the mid-section that is flattened compared to what otherwise would exist without the presence of the greater radial stiffness in the mid-section and which is characteristic of an enlarged sweet spot.

15. (Withdrawn) A bat as in claim 14 wherein the barrel portion comprises a barrel wall of polymer composite material and the polymer composite material provides a radial stiffness in the barrel wall within the mid-section of the barrel portion which is greater than the radial stiffness of the barrel wall within the lateral regions.

16. (Withdrawn) A bat as in claim 15 wherein the polymer composite material contains reinforcing fibers and the reinforcing fibers are angled within the barrel wall of the mid-section to

provide the barrel wall with a radial stiffness in the mid-section that is greater than the radial stiffness of the barrel wall within the two lateral regions of the barrel portion.

17. (Withdrawn) A bat as in claim 15 wherein the polymer composite material contains reinforcing fibers at various angles with respect to the longitudinal axis, the reinforcing fibers present within the barrel wall of the mid-section being at a higher average angle from the longitudinal axis than the average angle of the fibers within the barrel wall of the two lateral regions of the barrel portion.

18. (Withdrawn) A bat as in claim 15 wherein the polymer composite material contains reinforcing fibers of types having differing stiffnesses, and the reinforcing fibers within the barrel wall of the mid-section contain a higher percentage of fibers of higher stiffness than in the lateral regions to provide the barrel wall with a radial stiffness in the mid-section that is greater than the radial stiffness of the barrel wall within the two lateral regions of the barrel portion.

19. (Withdrawn) A bat as in claim 15 wherein the barrel wall has a thickness and wherein the polymer composite material of the barrel wall is of a greater thickness within the barrel wall of the mid-section than in the lateral regions by at least  $8\frac{1}{3}\%$  to provide the barrel wall with a radial stiffness in the mid-section that is greater than the radial stiffness of the barrel wall within the two lateral regions of the barrel portion.

20. (Withdrawn) A bat as in claim 14 wherein the barrel wall has a thickness and the thickness of the barrel wall in the mid-section is greater than the thickness of the barrel wall in the lateral regions by at least  $8\frac{1}{3}\%$  whereby the radial stiffness of the barrel wall in the mid-section of the barrel portion is greater than the radial stiffness of the barrel wall in the lateral regions.

21. (Withdrawn) A bat as in claim 20 wherein the thickness of the mid-section of the barrel portion is greater than the thickness of the lateral regions at their thinnest parts by at least 5%.

22. (Withdrawn) A bat as in claim 14 wherein the barrel portion has inner and outer surfaces, the barrel portion comprising a stiffener positioned along the mid-section of the barrel portion adjacent the inner or outer surface of the barrel portion, whereby the radial stiffness of the barrel

wall with the stiffener present along the mid-section of the barrel portion is greater than the radial stiffness of the barrel wall in the lateral regions.

23. (Withdrawn) A bat as in claim 22 wherein the stiffener has a stiffener wall having a thickness of between .005 inches 0.040 inches.

24. (Withdrawn) A bat as in claim 22 wherein the stiffener has a length of 2 to 6 inches.

25. (Withdrawn) A bat as in claim 22 wherein the stiffener is unbonded along its length to the barrel portion.

26. (Withdrawn) A bat as in claim 22 wherein the stiffener is bonded at least partially along its length to the barrel portion.

27. (Withdrawn) A bat as in claim 22 wherein the stiffener is bonded fully along its length to the barrel portion.

28. (Withdrawn) A bat as in any one of claims 22, 23, 24, 25, 26 or 27 wherein the stiffener is located on the inner surface of the barrel portion.

29. (Withdrawn) A bat as in any one of claims 22, 23, 24, 25, 26 or 27 wherein the stiffener is located on the external surface of the barrel portion.

30. (Withdrawn) A bat as in any one of claims 22, 23, 24, 25, 26 or 27 wherein the stiffener is composed of polymer composite material which comprises a resin matrix encapsulating reinforcement fibers wherein the resin is selected from the group of resin consisting of epoxy, vinyl ester, polyester, urethane, nylon, and mixtures thereof and wherein the reinforcement fibers are selected from the group consisting of fiberglass, graphite, carbon, aramid, boron, nylon fibers and mixtures thereof.

31. (Canceled)

32. (Canceled)

33. (Withdrawn) A bat as in any one of claims 14, 15, 16, 17, 18, 19, or 20 wherein the mid-section has a length that is less than 33.3% of the length of the barrel portion.

34. (Withdrawn) A bat as in 33 wherein the mid-section has a length that is less than 25% of the length of the barrel portion.

35. (Withdrawn) 16 2/3% of the length of the barrel portion.

36. (Withdrawn) A bat as in any one of claims, 15, 16, 17, 18, 19 or 20 wherein the bat consists of polymer composite material which comprises a resin matrix encapsulating reinforcement fibers wherein the resin is selected from the group of resin consisting of epoxy, vinyl ester, polyester, urethane, nylon, and mixtures thereof and wherein the reinforcement fibers are selected from the group consisting fiberglass, graphite, carbon, aramid, boron, nylon fibers and mixtures thereof.

37. (Currently amended) A tubular ~~baseball~~ bat with a longitudinal axis comprising a cylindrical handle portion for gripping, a cylindrical tubular barrel portion of given length for striking, the barrel portion having a barrel wall with a barrel wall thickness and distinct locations and including a sweet spot area within its length, and a tapered portion connecting the handle portion and the barrel portion, wherein the barrel portion has:

- a) a distal end remote from the handle;
- b) a proximal end where the tapered portion connects to the handle portion;
- c) a mid-section within the barrel portion, the mid-section being of shorter length than the length of the barrel portion and including the sweet spot area; and
- d) two lateral regions extending on either sides side of the mid-section towards the distal and proximal ends respectively,

the radial stiffness of the barrel wall being greater in the mid-section of the barrel portion than in the two lateral regions of the barrel portion

wherein the barrel wall of the barrel portion consists of polymer composite material containing reinforcing fibers at various angles with respect to the longitudinal axis, the reinforcing fibers present within the barrel wall of the mid-section being at a higher average angle with respect to the longitudinal axis than the average angle of the fibers within the barrel wall of the two lateral regions of the barrel portion

**to provide the barrel wall with said radial stiffness in the mid-section that is greater than the radial stiffness of the barrel wall within the two lateral regions of the barrel portion and thereby with a broadened sweet spot.**

38.(Currently amended) A tubular baseball bat with a longitudinal axis comprising a cylindrical handle portion for gripping, a cylindrical tubular barrel portion of given length for striking, the barrel portion having a barrel wall with **a barrel wall thickness and** distinct locations **and including** a sweet spot area within its length, and a tapered portion connecting the handle portion and the barrel portion, wherein the barrel portion has:

- a) a distal end remote from the handle;
- b) a proximal end where the tapered portion connects to the handle portion;
- c) a mid-section within the barrel portion, the mid-section being of shorter length than the length of the barrel portion and including the sweet spot area; and
- d) two lateral regions extending on either ~~sides~~ side of the mid-section towards the distal and proximal ends respectively,

the radial stiffness of the barrel wall being greater in the mid-section of the barrel portion than in the two lateral regions of the barrel portion

wherein the barrel wall of the barrel portion consists of polymer composite material which contains reinforcing fibers and the barrel wall in the mid-section contains a higher percentage of fibers than in the lateral regions

to provide the barrel wall with **[[a]] said** radial stiffness in the mid-section that is greater than the radial stiffness of the barrel wall within the two lateral regions of the barrel portion **and thereby with a broadened sweet spot.**

39.(Currently amended) A tubular ~~baseball~~ bat comprising a cylindrical handle portion for gripping, a cylindrical tubular barrel portion of given length for striking, the barrel portion having a barrel wall a barrel wall thickness and distinct locations and including a sweet spot area within its length, and a tapered portion connecting the handle portion and the barrel portion, wherein the barrel portion has:

- a) a distal end remote from the handle;
- b) a proximal end where the tapered portion connects to the handle portion;
- c) a mid-section within the barrel portion, the mid-section being of shorter length than the length of the barrel portion and including the sweet spot area; and
- d) two lateral regions extending on either ~~sides~~ side of the mid-section towards the distal and proximal ends respectively,

the radial stiffness of the barrel wall being greater in the mid-section of the barrel portion than in the two lateral regions of the barrel portion

wherein the barrel wall of the barrel portion consists of polymer composite material wherein the polymer composite material contains reinforcing fibers of types having differing stiffnesses, and the reinforcing fibers within the barrel wall of the mid-section contain a higher percentage of fibers of higher stiffness than in the lateral regions

to provide the barrel wall with ~~[[a]]~~ said radial stiffness in the mid-section that is greater than the radial stiffness of the barrel wall within the two lateral regions of the barrel and thereby with a broadened sweet spot.

40. (Withdrawn) A tubular baseball bat comprising a cylindrical handle portion for gripping, a cylindrical tubular barrel portion of given length for striking, the barrel portion having a barrel wall and a sweet spot area within its length, and a tapered portion connecting the handle portion and the barrel portion, wherein the barrel portion has:

- a) a distal end remote from the handle;
- b) a proximal end where the tapered portion connects to the handle portion;
- c) a mid-section within the barrel portion, the mid-section being of shorter length than the length of the barrel portion and including the sweet spot area; and

d) two lateral regions extending on either sides of the mid-section towards the distal and proximal ends respectively, wherein the barrel wall of the barrel portion has a thickness and the barrel wall has a thickness in the mid-section that is greater than the thickness of the barrel wall in the lateral regions by at least 8 1/3 % whereby the radial stiffness of the barrel wall in the mid-section of the barrel portion is greater than the radial stiffness of the barrel wall in the lateral regions which is characteristic of an enlarged sweet spot.

41. (Withdrawn) A bat as in claim 40 wherein the thickness of the mid-section of the barrel portion is greater than the thickness of the lateral regions at their thinnest parts by at least 5%.

42. (Withdrawn) A bat as in any one of claims 31, 32, 36, 37, 38, 39, or 40 wherein the mid-section has a length that is less than 50% of the length of the barrel portion.

43. (Withdrawn) A bat as in claim 42 wherein the mid-section has a length that is less than 33.3% of the length of the barrel portion.

44. (Withdrawn) A bat as in claim 42 wherein the mid-section has a length that is less than 25% of the length of the barrel portion.

45. (Withdrawn) 16 2/3% of the length of the barrel portion.

46. (Withdrawn). A bat as in any one of Claims 14, 15, 16, 17, 18, 31, 32, 33, 34, 35, 36, 37, 38, or 39 wherein the barrel wall of the barrel portion has a thickness and the barrel wall has a thickness in the mid-section that is greater than the thickness of the barrel wall in the lateral regions by reason of an additional thickness, the additional thickness of the barrel wall in the mid-section over the thickness of the barrel wall in the two lateral regions being in the range 0.010 inches to 0.040 inches.

47. (Withdrawn). A bat as in Claim 46 wherein the additional thickness of the barrel wall in the mid-section of the barrel portion over the thickness of the barrel wall in the two lateral regions is in the range 0.015 inches to 0.040 inches.

48. (Withdrawn) A bat as in Claim 46 wherein the additional thickness of the barrel wall in the mid-section of the barrel portion over the thickness of the barrel wall in the two lateral regions is in the range 0.015 inches to 0.030 inches.

49. (Withdrawn). A bat as in any one of Claims 19, 20, or 40 wherein the greater thickness within the barrel wall of the mid-section provides an additional thickness and the additional thickness of the barrel wall in the mid-section of the barrel portion over the thickness of the barrel wall in the two lateral regions is in the range 0.010 inches to 0.040 inches.

50. (Withdrawn). A bat as in Claim 49 wherein the additional thickness of the barrel wall in the mid-section of the barrel portion over the thickness of the barrel wall in the two lateral regions is in the range 0.015 inches to 0.040 inches.

51.(Withdrawn) A bat as in Claim 49 wherein the additional thickness of the barrel wall in the mid-section of the barrel portion over the thickness of the barrel wall in the two lateral regions is in the range 0.015 inches to 0.030 inches.

52.(Withdrawn) A bat as in any one of the claims 14, 15, 16, 17, 18, 19, 20, 33, 34, 35 or 36 wherein the region of flattened batting performance over the mid-section is at least 4 inches in length extending longitudinally along the bat.

53.(New) A tubular bat with a longitudinal axis comprising a cylindrical handle portion for gripping, a cylindrical tubular barrel portion of given length for striking, the barrel portion having a barrel wall with a barrel wall thickness and distinct locations including a sweet spot area within its length, and a tapered bridging portion connecting the handle portion and the barrel portion, wherein the barrel portion has:

- a) a distal end remote from the handle;
- b) a proximal end where the tapered portion connects to the handle portion;
- c) a mid-section within the barrel portion, the mid-section being of shorter length than the length of the barrel portion and including the sweetspot area;
- d) two lateral regions extending on either side of the mid-section towards the distal and proximal ends respectively, and



- e) a radial stiffness for the barrel wall at each location along the length of the barrel portion

wherein the barrel wall thickness in the barrel mid-section that contains the sweet spot area is greater than the thickness of the barrel wall in the lateral regions and:

- the thickness of the total barrel wall is at least 5% greater in the barrel mid-section than in the two lateral regions;

- the thickness of the total barrel wall is 0.005 to 0.040 inches greater in the barrel mid-section than in the two lateral regions, and

- the area of greater thickness in the barrel mid-section is integrally formed with the barrel wall portion whereby the thickened portion is formed of the same material as the underlying barrel wall portion without there being present a boundary therebetween whereat different materials are in contact with each other,

to provide the barrel wall with a radial stiffness in the mid-section that is greater than the radial stiffness of the barrel wall within the two lateral regions of the barrel portion and thereby with a broadened sweet spot.

54.(New) A bat as in claim 37 wherein the barrel wall thickness in the barrel mid-section is greater than the thickness of the barrel wall in the lateral regions and:

- the thickness of the total barrel wall is 0.005 to 0.040 inches greater in the barrel mid-section than in the two lateral regions, and

- the area of greater thickness in the barrel mid-section is integrally formed with the barrel wall portion whereby the thickened portion is formed of the same material as the underlying barrel wall portion without there being present a boundary therebetween whereat different materials are in contact with each other,

to provide the barrel wall with a radial stiffness in the mid-section that is greater than the radial stiffness of the barrel wall within the two lateral regions of the barrel portion and thereby with a broadened sweet spot.

55.(New) A bat as in claim 38 wherein the barrel wall thickness in the barrel mid-section is greater than the thickness of the barrel wall in the lateral regions and:

- the thickness of the total barrel wall is 0.005 to 0.040 inches greater in the barrel mid-section than in the two lateral regions, and

- the area of greater thickness in the barrel mid-section is integrally formed with the barrel wall portion whereby the thickened portion is formed of the same material as the underlying barrel wall portion without there being present a boundary therebetween whereat different materials are in contact with each other,

to provide the barrel wall with a radial stiffness in the mid-section that is greater than the radial stiffness of the barrel wall within the two lateral regions of the barrel portion and thereby with a broadened sweet spot.

56.(New) A bat as in claim 39 wherein the barrel wall thickness in the barrel mid-section is greater than the thickness of the barrel wall in the lateral regions and:

- the thickness of the total barrel wall is 0.005 to 0.040 inches greater in the barrel mid-section than in the two lateral regions, and

- the area of greater thickness in the barrel mid-section is integrally formed with the barrel wall portion whereby the thickened portion is formed of the same material as the underlying barrel wall portion without there being present a boundary therebetween whereat different materials are in contact with each other,

to provide the barrel wall with a radial stiffness in the mid-section that is greater than the radial stiffness of the barrel wall within the two lateral regions of the barrel portion and thereby with a broadened sweet spot.

57. (New) A bat as in any one of Claims 37, 38, 39 or 53 wherein the thickness of the barrel wall is 0.010 to 0.040 inches greater in the barrel mid-section than in the two lateral regions.

58. (New) A bat as in Claim 57 wherein the thickness of the barrel wall is 0.015 to 0.040 inches greater in the barrel mid-section than in the two lateral regions.

59. (New) A bat as in Claim 57 wherein the thickness of the barrel wall is 0.015 to 0.030 inches greater in the barrel mid-section than in the two lateral regions.

60. (New) A bat as in Claim 57 wherein the increased thickness of the barrel wall in the barrel mid-section is the only part of the barrel portion that is of increased thickness over the thickness of the barrel wall in the lateral regions.

61. (New) A bat as in Claim 57 wherein the barrel mid-section of increased thickness is centered around the middle of the barrel.

62. (New) A bat as in Claim 57 wherein the lateral regions start 1" to 3" from the center of the mid-section and extend towards the proximal and distal barrel ends

63. (New) A bat as in Claim 57 wherein the mid-section has a length that is less than 33.3% of the length of the barrel portion.

64. (New) A bat as in Claim 57 wherein the mid-section has a length that is less than 25% of the length of the barrel portion.

65. (New) A bat as in Claim 57 wherein the mid-section has a length that is less than 16 2/3% of the length of the barrel portion.

66.(New) A bat as in Claim 57 wherein the mid-section has a length that is less than 12 1/2% of the length of the barrel portion.

67.(New) A bat as in Claim 57 wherein the bat is a single wall bat.

68.(New) A bat as in Claim 57 wherein the bat is a multi-wall bat, which includes a double wall bat.

69.(New) A bat as in Claim 57 wherein the barrel wall thickness on either side of the barrel mid-section that contains the sweet spot area is graduated towards a decreasing thickness within the lateral regions.

70.(New) A bat as in claim 57 wherein the thickness of the total barrel wall is at least 8 1/3 % greater in the barrel mid-section than in the two lateral regions.

71.(New) A bat as in Claim 53 wherein the barrel wall consists of polymer composite material.